Chapter Four: Current and Projected Uses of the Beaufort Sea Area

Contents

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A. Historical Background

Evidence of human occupation and use of the Arctic Coastal Plain dates back to 10,000 B.C. Marine mammal harvesting on winter sea ice has occurred for at least four thousand years, and evidence of whaling is 3,400 years old (Langdon, 1996). The record of human existence on the North Slope is characterized by several distinct cultural periods marked by changes in tool style (NSBCMP, 1984a:2-1). The environmental characteristics of the Arctic shaped Inupiat culture into a semi-nomadic society with a tradition of whaling and an emphasis on seasonal inland hunting. This pattern of land use remained unchanged until the second half of the 19th century with the arrival of westerners, new tools, and due to natural events, such as caribou population decline (NSBCMP, 1984a)(NSB, 1979).

Numerous sites across the North Slope containing sod houses, graves, storage pits, ice cellars, bones and relics attest to the historical use and presence of Arctic people in the sale area, however, much of the archaeological record has been destroyed by erosion (Hoffman, et al., 1988). For centuries, trading centers, such as Barter Island and Nigalik, at the mouth of the Colville River, were used by Canadian and Alaskan Eskimos (Jacobson & Wentworth, 1982). Eskimos of the North Slope also traded with Asia across the Bering Strait as early as the mid-1700's (Langdon, 1996) (NSBCMP, 1984a).

European explorers and fur traders began arriving in the sale area during the 1820s and 30s. This contact introduced metal tools, traps, and guns to support trading and hunting. Russian trading posts were established from Norton Sound southward. After bowhead whale migration paths were discovered, commercial whaling increased dramatically in the Arctic after 1850 and into the 1880s. Several whaling stations were built along the coast, providing for regular contact and trading with Natives. Steamships, later replaced sailing vessels, facilitating year round access. Increased hunting pressure and a natural decline reduced the population of the western caribou herd. This, coupled with western diseases, such as measles and influenza, resulted in an increase in the death rate of the inland Eskimo. Coastal Inupiat also suffered population decline from foreign diseases (NSBCMP, 1984a)

By World War I, declining whale populations and a decreased demand for whale oil and baleen brought an end to the commercial whaling period. However, demand for fur, particularly Arctic fox, resulted in the continued presence of westerners along the Beaufort Coast and North Slope. Native residents who were engaged in trapping provided income for non-subsistence resources. By 1914, trapping camps used in the thriving fur trade were established from Barrow to the Canadian border (NSBCMP, 1984a)(Hoffman, et al., 1988:8). In the 1930s, however, the price of fur plummeted, forcing many traders to leave the region near the lower Colville River. Many residents moved to other settlements in Alaska (Hoffman, et al., 1988).

World War II brought an influx of military personnel into Alaska and the petroleum exploration period began. Inupiat were hired to work on construction projects, including the Naval Arctic Research Laboratory near Barrow in 1947, and the Distant Early Warning (DEW) line defense sites in the early 1950s (NSBCMP, 1984a). Before 1950, the lower Colville River supported many families, until the Bureau of Indian Affairs required that children attend schools, and most residents relocated in Barrow (NSB, 1979).

The contemporary period of modernization and change began in the 1960s. The discovery of the Prudhoe Bay oil field in 1967 prompted a renewed interest in petroleum exploration and development, but before oil reserves could be developed, Native land claims had to be settled. "In response to rapid change that threatened Native land rights through land transfers, biological resource limitations, and natural resource leasing (primarily oil and gas), Inupiat political groups formed regional organizations to protect their rights and culture" (NSBCMP, 1984a:2-8). The Alaska Native Claims Settlement Act was passed in 1971 which

created village and regional Native corporations and provided a mechanism for the transfer of land ownership to Native Alaskans (NSBCMP, 1984a).

Prior to the building period of the late 1970s and 1980s, few services were provided to residents, few jobs were available, and living conditions were austere across the Arctic Slope of Alaska. All communities lacked sanitation services, running water, telephones in homes, community centers and modern recreation facilities. The incorporation of the North Slope Borough (NSB) in 1972 provided residents with local government powers and a mechanism to assess and tax oil and gas infrastructure. Incorporation also created responsibilities of planning, zoning, education and utilities. Petroleum revenues and other funding have provided the borough with resources to pay for schools, fire stations, medical clinics, health care services, utilities, public safety facilities, family assistance programs, workforce development programs, community centers, public housing, administrative facilities, and jobs for borough residents (NSB, 1993).

B. North Slope People and Economy

The entire Arctic Coastal Plain of Alaska, from the northern foothills of the Brooks Range to the Beaufort Sea, and from Point Hope on the Chukchi to the Canadian border, is contained within the North Slope Borough's 94,770 sq. mi.; an area about the size of Oregon. The financial and population center of the borough is located at the city of Barrow, incorporated in 1958. Other communities or villages within the borough are Point Hope, Point Lay, Wainwright, Atqasuk, Nuiqsut, Kaktovik, Anaktuvuk Pass, and Deadhorse (ADCRA, 1995). Deadhorse is an industry-support community, distinct in nature from the other communities.

Three communities are located near the sale area: Barrow, Nuiqsut, and Kaktovik. Barrow is located near the western edge of the sale area, Nuiqsut is located on the Colville River delta, and Kaktovik is on the north shore of Barter Island in the eastern portion of the sale area. These villages are likely to feel the greatest impact on subsistence activities from the sale. If reserves are discovered and developed, all Alaskans will experience the economic effects of the Beaufort Sea Areawide sale through permanent fund dividends, and state services and programs funded by petroleum revenues.

1. Community Information

The North Slope Borough, incorporated in1972, has a population of 9,389. In area, it is the largest borough in Alaska, comprising over 15 percent of the total land area of Alaska. Alaska Natives comprise 72.5 percent of the population. The majority of permanent residents are Inupiat Eskimos. Traditional marine mammal hunts and other subsistence practices are an active part of the culture. Inupiat Eskimos have lived in the region for centuries, and have been active in trading between Alaskan and Canadian bands. Oil exploration in the 1960s led to the development of the huge reserves in Prudhoe Bay and, subsequently, the Trans-Alaska Pipeline in the 1970s (ADCRA, 1997). Today, tax revenues from the North Slope oil fields fund borough-wide services and have contributed to the development of the communities. During the April 1990 U.S. Census, there were 2,153 total housing units, and 480 of these were vacant (ADCRA, 1997).

Barrow, the northernmost community in North America, is located on the Chukchi Sea coast, 10 miles south of Point Barrow from which it takes its name. It has a population of 4,397. The majority of residents are Inupiat Eskimos. The area encompasses 19 sq. mi. of land and 2 sq. mi. of lakes. Prudhoe Bay oil fields and Trans-Alaska Pipeline have each contributed to the development of Barrow.

During the April 1990 U.S. Census, there were 1,184 total housing units, and 125 of these were vacant. 1,594 jobs were estimated to be in the community. There are three schools located in the community, attended by 1,308 students (ADCRA, 1997).

Nuiqsut is located on the west bank of the Nechelik Channel of the Colville River Delta, about 35 miles from the Beaufort Sea coast. It has a population of 459. The area encompasses 8 sq. mi. of land. Nuiqsut was one of three abandoned Inupiat villages identified in the Alaska Native Claims Settlement Act, and was

resettled in 1973 by 27 families from Barrow. Housing and facilities were constructed by federal agencies in the summer of 1973 and 1974 (ADCRA, 1997).

Alaska Natives comprise 92.7 percent of the population. The majority of the population are Inupiat Eskimos practicing a traditional subsistence lifestyle. During the April 1990 U.S. Census, there were 102 total housing units, and 11 of these were vacant. 103 jobs were estimated to be in the community. There is one school located in the community, attended by 165 students (ADCRA, 1997).

Kaktovik lies on the north shore of Barter Island, between the Okpilak and Jago Rivers on the Beaufort Sea coast, within the 19.6-million-acre Arctic National Wildlife Refuge. It has a population of 255 The area encompasses 1 sq. mi. of land. Until the late nineteenth century the island was a major trade center for the Inupiat and was especially important as a bartering place for Inupiat from Alaska and Inuit from Canada (ADCRA, 1997).

Alaska Natives comprise 84.4 percent of the 225 residents. During the April 1990 U.S. Census, there were 82 total housing units, and 15 of these were vacant. 79 jobs were estimated to be in the community. There is one school located in the community, attended by 77 students (ADCRA, 1997).

Deadhorse is located near the center of the Prudhoe Bay-Kuparuk oil fields and was settled during the development years of the 1970s. Transient work forces are not included in the U.S. Census, because they reside in other communities. According to the Department of Community and Regional Affairs, Deadhorse/Prudhoe Bay is home to just 25 residents, whereas about four to five thousand employees work at the Deadhorse industrial complex (ADCRA, 1997).

2. Transportation and Utilities

Barrow is an historic trading center for Arctic Alaska. Transportation in winter is accomplished via snow machine over trails, which connect villages and campsites. In summer, boats navigate rivers. Air transportation links all communities on the North Slope year-round. Barrow residents get their electric power from the member-owned Barrow Utilities & Electric Cooperative, which also operates the city's water and sewage treatment plant, and distributes natural gas for heating to nearly every household. About half of Barrow households are connected to a public sewer system, and the other half use honeybuckets (ADCRA, 1997).

A year-round airstrip provides transportation to and from Nuiqsut, while snow machines and an ice-road are used in winter. In the summer, riverboats navigate up and down the north-flowing Colville, Itkillik, Chandler, and Anaktuvuk rivers. Nuiqsut residents derive electric power from a NSB Power & Light System. Over 70 percent of homes have complete plumbing. Residents have individual water tanks and water is derived from a lake and treated. Ninety-seven percent of homes are heated with fuel oil or kerosene. Plans are being developed to provide the community with natural gas from the nearby Alpine discovery. The community has no sewer system, and residents must use honeybuckets, however, funds have been requested for a water and sewer project to provide running water, flush toilets, and showers to residents (ADCRA, 1997).

Air travel provides year-round access to Kaktovik via the Barter Island Airport, owned and operated by the U.S. Air Force. Kaktovik residents derive electric power from a NSB Power and Light System. Currently, the community has no sewer system, and residents must use honeybuckets. Funds have been requested to provide a piped system with flush toilets, showers, and plumbing for all residences. Design of the system is in process (ADCRA, 1997).

Deadhorse is located near the terminus of the Dalton Highway on the Beaufort coast, which provides year-round access to Fairbanks and beyond. This community is serviced by jet aircraft, and is the site of a 6,500 ft, asphalt runway. Deadhorse derives its electric power from the burning of natural gas at two main power generation facilities, and from waste heat generated from oil and gas processing. This electricity is distributed via utility lines to Kuparuk oil field in the west, and Endicott to the east. Freshwater is obtained from nearby lakes, and all wastewater is treated before being discharged into nearby ponds (ADCRA, 1997).

3. Occupations and Earnings

Local government is the largest employer of NSB residents, providing one of every three full-time positions. In 1990, local government provided 1,454 jobs, the private sector employed 891, federal government employed 177, and state government employed 60. Of those engaged in wage earning positions, more than half were employed in the administrative and health services sector. In 1990, thirty-five percent of the borough's 2,531 residents were old enough to participate in the wage earning work force, but did not (ADCRA, 1995). A 1993 survey revealed that for all communities in the borough, except Barrow, more than one in three residents indicated they were involuntarily under-employed (NSB, 1993). Self-employment and non-paid activities provide other occupations. Nine residents, for example, held commercial fishing permits in 1995. Median household income in the borough was $50,473 in 1990 (ADCRA, 1997).

According to the Alaska Department of Labor, more than $485 million was earned in the NSB in 1995. Government payrolls accounted for about 20 percent of that (almost $105 million), and the oil and gas extraction industry accounted for approximately 55 percent ($267 million). More than $29 million went to construction workers, $27.5 million were earned in the transportation, communications, and utilities sector, and more than $30 million went to the services sector, mostly in the business services segment. The 1995 earnings from local government exceeded $99 million (ADOL, 1996b). See Chapter Five "Fiscal Effects" for additional information on NSB employment.

The median household income for Nuiqsut was $32,188; a 14 percent increase from 1980. Cash employment in Nuiqsut is limited, due in part to its isolation (ADCRA, 1997). Nearly two thirds of the wages earned in Nuiqsut in 1993 came from local government. Those jobs provided more that 55 percent of all jobs in the community. Eighty-five percent of households had one or more members employed in local government, 32 percent had members employed in construction**,** almost 20 percent had members employed in the finance, insurance, and real estate sector, and 16 percent of households had members employed in the trade industry. Of the estimated 176 adults in the community, those who participated in the wage earning portion of the economy had worked between two and three jobs (ADF&G, 1997).

Median household income for Kaktovik was $42,250 in 1990, a nine percent increase from a decade earlier. Cash employment in Kaktovik, like Nuiqsut and other remote villages is also limited (ADCRA, 1997). Nearly 80 percent of the earned income for the community came from local government, which provided more that 60 percent of all wage earning jobs in the community. In 1992, nearly every household in Kaktovik had one or more members employed in local government, 35 percent had members employed in the finance, insurance, and real estate sector, and 15 percent had members employed in the trade and manufacturing sector (ADF&G, 1995). For all households in the community, average gross income in 1992 was $55,688. Of the estimated 129 adults in the community, the number of jobs per person averaged 2.34 (ADF&G, 1995).

Deadhorse's four to five thousand transitional employees work and live in the surrounding oil field complex. Most oil industry employees work 12-hour shifts, seven days a week, on a two-week-on, two-week-off schedule. Permanent residents of the community are employed principally in the wholesale trade, retail trade, mining (oil and gas extraction), and personal services industries (ADCRA, 1997).

Throughout the region the importance of local government in providing services, improving the standard of living, and in providing sources of cash and employment to residents cannot be overemphasized. For detail on NSB and municipal government finance, see Chapter Five.

C. Subsistence and The Value of Fish & Wildlife

For a thorough compilation of subsistence base-line information for the sale area, see Pederson et al., (1985) and (1991); Hoffman et al., (1988); MMS (1995) (1990) and (1987); Jacobson and Wentworth (1982); ADF&G, (1995); NSBCMP (1984a)(1984b) and (1988); and NSB (1997)(1979).

1. The Meaning and Protection of Subsistence Values

In Alaska, subsistence uses include hunting, fishing and gathering for the primary purpose of acquiring food (Case, 1984). Under Title 19 of the North Slope Borough Municipal Code (NSBMC), subsistence is defined as "an activity performed in support of the basic beliefs and nutritional needs of the residents of the borough and includes hunting, whaling, fishing, trapping, camping, food gathering, and other traditional and cultural activities." (NSBMC 19.20.020(67)) ANILCA defines subsistence usage as customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade (16 U.S.C. § 3113). Subsistence in Alaska is more than harvesting, gathering, processing, sharing, and trading. Subsistence also includes cultural, social, and economic values associated with the taking, use, and exchange of plants, fish and game. Subsistence embodies the essence of Inupiat culture.

Inupiat culture is characterized by strong kinship ties, cooperative efforts, and sharing. Inupiat who maintain a close relationship to the land and perpetuate an understanding of the seasons and animals by educating youth are highly respected. Land and the natural environment is primary and sacred in the Inupiat world view. Names and songs identify the land. The Inupiat view, being a part of the environment, rather than apart from it, resulted in a subsistence life of complete dependence on the near environment, weather and living resources (NSB, 1979).

The collection, processing, and distribution of subsistence resources nearly always involves some group activity. The continued opportunity to engage in subsistence uses is a fundamental component of all Alaska Native cultures, and serves as the keystone to social, ethnic and psychological identity.

Most subsistence resources harvested are shared, traded or given to others. Non-subsistence goods purchased with wages are also shared. Subsistence resources cannot be purchased with money, and they must be "earned" by hunting. On the other hand, subsistence technology, such as boats, all-terrain vehicles, fuel, and gear can be purchased with cash.

Since the discovery of oil in Prudhoe Bay and the advent of oil and gas infrastructure development in the Arctic, village elders, and traditional Inupiat persistently express concerns that subsistence is being threatened. The once open range of the Kuparuk and Sagavanirktok Rivers is now complicated by the presence of above-ground pipelines, spine roads, utility lines, and large facilities. Village leaders affirm that both outside pressures, and pressures within communities are challenging the system of values which has bonded them together (NSB, 1979).

Some western institutions have been willfully adopted into village life, such as education, health care, and economic necessities, like home building materials and fuel (NSB, 1979). Others have not, such as some fish and game regulations. For example, catch and release fishing, may be considered disrespectful in some Native cultures (Noland & Gallagher, 1989). Imposed seasons and bag limits restrict the taking of game, such as caribou, which were previously harvested year-round (Jacobson & Wentworth, 1982). Many traditional hunting, fishing, and gathering sites are on federally or state-managed land. Private and public ownership of lands and waters means that people are told where, when, and sometimes how they may hunt.

The Nuiqsut Cultural Plan (NSB, 1979), published just after the construction of TAPS, identified forces converging upon the Inuit culture: competing interests, oil and gas development, environmental degradation, access and use limitations, land tenure problems, socio-economic instability, and loss of cultural privacy (NSB, 1979). All of these forces pose a threat to subsistence life and the traditional Inupiat culture.

To assure that subsistence values are protected, the locations of harvest areas and sites, and the harvest and participation levels (demand for resources) must be identified. It is also essential, as well as legally mandated, that healthy populations of fish and wildlife be conserved. When it is necessary to restrict the taking of fish and wildlife, subsistence uses are given priority over other consumptive uses. Federal and state laws regulate subsistence use, access, and the trading of subsistence resources. On federal lands, the

federal government is required by Title VIII of ANILCA (1980) to provide a subsistence priority for rural Alaskan residents unless the state provides the same priority through its laws. Subsistence use and the allocation of fish and game is codified in state law at AS 16.05.258. In Alaska, subsistence is regulated by the USF&WS, Office of Subsistence Management, and the ADF&G, Division of Subsistence. For a discussion on the effects of this lease sale on subsistence uses, see Chapter Five.

2. Subsistence and The Mixed-Cash Economy

ADF&G conducts subsistence harvest surveys of communities throughout Alaska, and results are compiled in a computer database. Indicators tracked by ADF&G help to describe how the modern subsistence economy is functioning. Indicators include species availability and abundance within traditional subsistence harvest zones as well as levels of participation by community members. These factors are discussed below. Another indicator characterizing the cash-non-cash economic mix is the amount and distribution of cash income among residents of the area or community. This varies among communities depending on subsistence resource availability and the availability of jobs. The costs and availability of goods and services in a community also affect the cash-non-cash mix. In 1993, the cost of a standard market basket of food in Barrow was 1.99 times higher than in Anchorage. In Nuiqsut and Kaktovik it was 2.29 (ADF&G, 1997).

The relationship between earning cash wages and engaging in subsistence activities is different for each individual and depends on individual life choices and the flexibility of the available wage employment. Many residents choose to work seasonally, part-time, or just temporarily. Use preferences of individuals depend on cash availability (cash for supplies and transportation), job or village responsibilities, and resource preferences (NSB, 1979:30). Those who choose to hunt are likely to benefit from shared resources derived from wage earners, and vice versa (NSB, 1979) (Jacobson & Wentworth, 1982). Residents holding cash paying positions conduct subsistence activities during non-work periods, weekends, and vacations (NSBCMP, 1984a).

Employment for wages (including full-time, part-time, temporary, and seasonal positions) for both advantages and sacrifices for village residents. Wages provide residents with the cash necessary to function in modern village communities, and provide families with money for housing and associated costs. Job opportunities created by the NSB has resulted in more disposable income being available in the communities of the borough (Bryner, 1995).

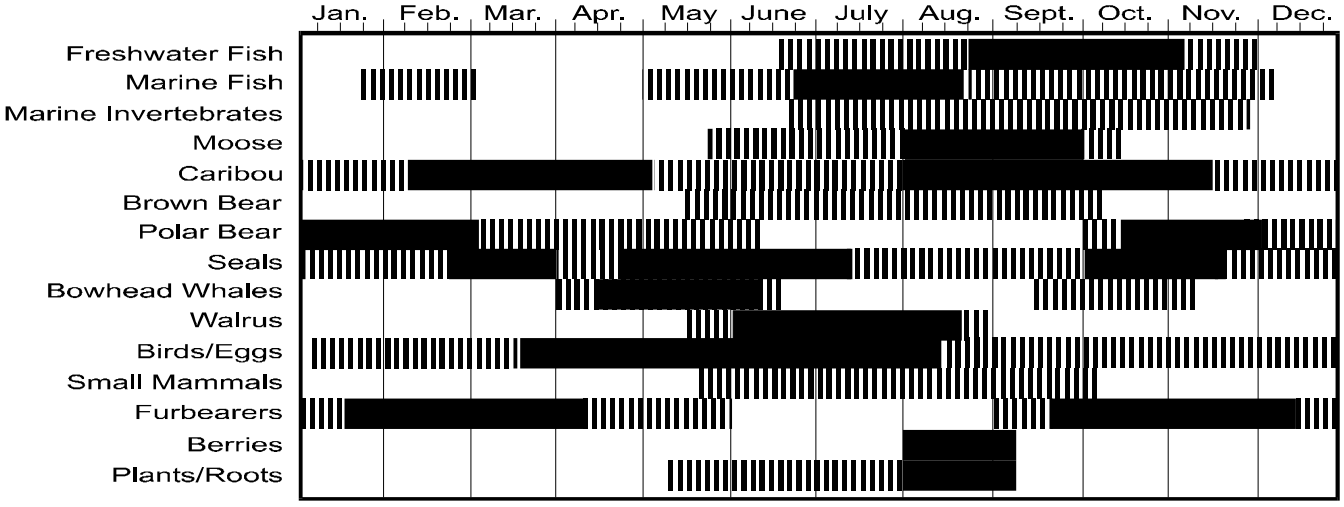
Only a small percentage of the full-time oil industry jobs on the North Slope are held by local residents. This is partially explained by the small labor force located within the borough relative to the large labor demands of industry. While some full-time oil industry positions may be available, they often require time away from the traditional village economy. The cost to the community of oilfield employment may be greater than the cash benefits and income stability gained from participating in the industrial labor force. The remoteness of villages with respect to oil field infrastructure, coupled with long shift hours, means that employees are likely to be separated from their families and children.

3. Seasonal Cycle of Economic Activity and Subsistence Use Areas

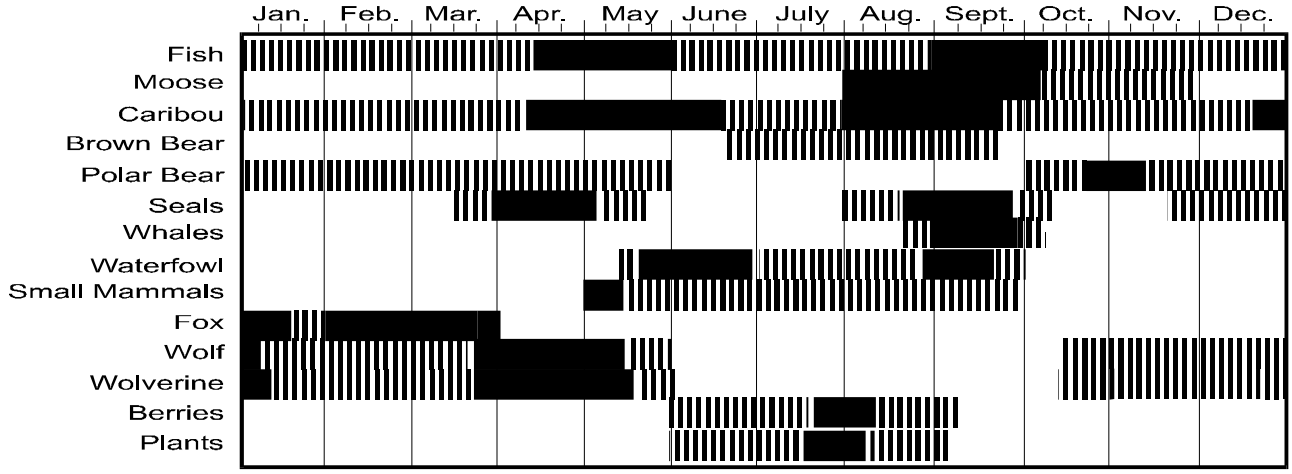
Seasons along the Arctic coast are marked by the arrival and departure of sea ice, river ice, and changing winds. After the break-up of river ice and the retreat of fast ice along the shoreline, the tundra thaws and mobility is restricted to open waterways and established trails. Seasons are also marked by the arrival and departure of migrating caribou, waterfowl, and the bowhead whale. In summer, the primary mode of transportation is by small skiff (14 to 18 ft) capable of navigating the shallow channels of the river deltas and lagoons or by ATV for overland travel. In winter, snow machines provide a means of transportation to and from hunting and fishing camps and trade fairs. Historical subsistence access routes on the North Slope follow the major rivers or skirt the coast from the Canadian border to Wainwright and beyond. Subsistence use areas and the seasonal cycle of subsistence harvesting in the sale area are shown in Figure 4.1

FIGURE 4.1 Seasonal Use Harvest Activities

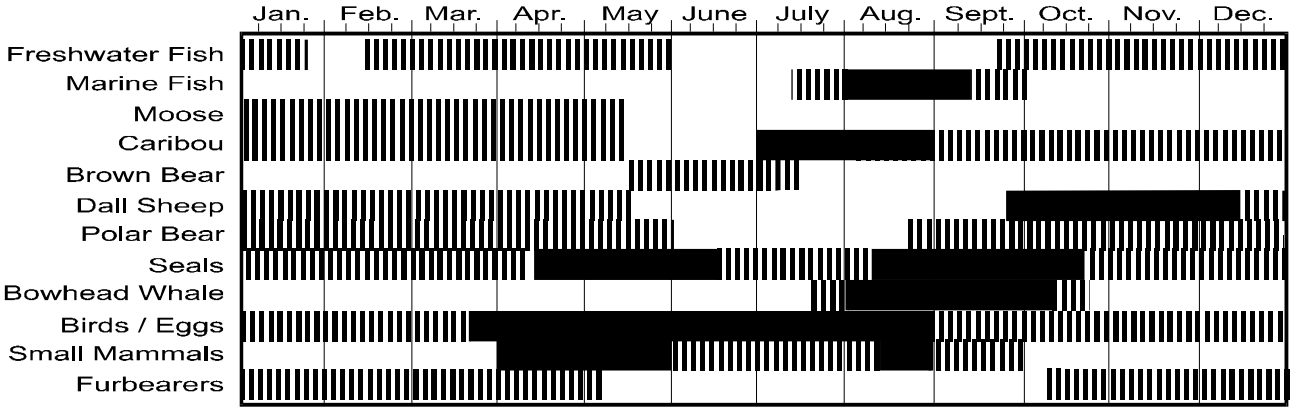
Seasonal use harvest activities by **Barrow** residents. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort.
(ADF&G 1986b, p.566)



Seasonal use harvest activities by **Nuiqsut** residents. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort.
(ADF&G 1986b, p.568)



Seasonal use harvest activities by **Kaktovik** residents. Solid line indicates time when harvest usually takes place. Broken line indicates occasional harvest effort.
(ADF&G 1986b, p.570)



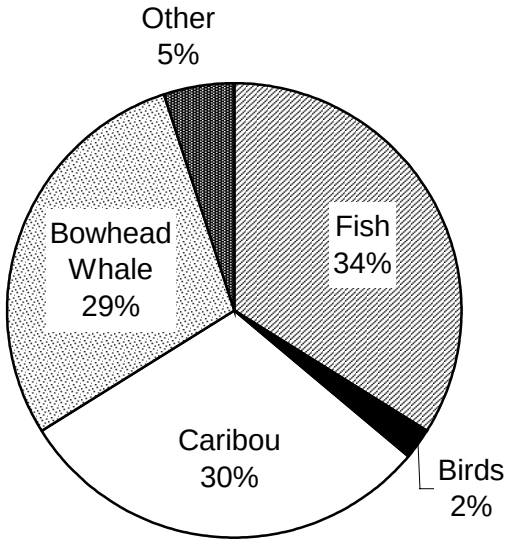
a. Nuiqsut

The Colville Delta has traditionally been a gathering and trading place for the Inupiat and has always offered good hunting and fishing. For residents of Nuiqsut, fishing occurs both during the summer and in the fall when the ice first becomes thick enough for snow machine travel. In June, after the ice goes out, broad whitefish move upriver. Two to four weeks after break-up, when muddy waters clear, fishing begins (Hoffman, et al., 1988:15). Residents travel from the village to fish along the river channels and fish and hunt for several days. Often several family members participate in the fishing activity. Those employed in wage earning positions may travel to the camps on weekends (George and Nageak, 1986:14). There are important traditional use sites along the lower Colville which include Uyagagviit, and Nigliq (Nannie Wood's Camp). According to Nuiqsut Mayor Leonard Lampe (1996) these sites have hosted subsistence activities since the late 1940s. Numerous other sites are in use today and are recorded in the NSB Traditional Land Use Inventory. Some of the important traditional use sites are identified in the literature (Hoffman, et al., 1988)(NSB, 1979)(ADF&G, 1986)(Jacobson & Wentworth, 1982). The NSB is developing a Geographic Information System inventory of subsistence uses and is in the process of revising its Coastal Management Atlas.

Geese and King Eider ducks fly low from west to east across the deltas along the coast in June, and are hunted with shotguns (Hoffman, et al., 1988). Caribou from the Central Arctic Herd (CAH) approach the Colville Delta in late May and early June. They calve in an area between the main channel of the Colville and Sagavanirktok River deltas. Also during June and into July, moose travel north along the upper Colville and Itkillik Rivers where they may be harvested later in the fall (Hoffman, et al., 1988).

Summer fishing with gill nets lasts throughout the open water season from early June to mid-September. Broad whitefish are the preferred and most numerous species caught. Others include the Arctic char, whitefish, cisco, burbot and grayling. A few chum and pink salmon are taken too. Gill nets account for of the fish caught (ADF&G, 1995). Grayling may be caught with rod and reel or with nets in creeks. Hunting for ringed and bearded seal begins in the open water off the delta in July and continues throughout the summer months (Hoffman, et al., 1988:16).

Figure 4.2 Nuiqsut Subsistence Harvest



Source: ADF&G Division of Subsistence, 1993 Survey Year

Although other species of fish are caught, the fall harvest, which lasts only two to three weeks, consists mainly of least and arctic cisco. The harvest is significantly higher in the fall than in the summer (George and Nageak, 1986:16) when Arctic char and salmon begin their migration upriver. Small whitefish and arctic cisco are harvested near the ocean, but these species do not move far upriver. Spotted seals, valued for their skins, follow the salmon and char upstream where they are hunted as far south as the meeting of the Itkillik and Colville Rivers. The optimum time to harvest caribou is near the end of August, when caribou are fat from summer grazing and fit for their long migration south. Their hides are in good condition and now suitable for making clothing. It is also before rutting season, a time when the bulls are not good to eat (Hoffman, et al., 1988).

In September, caribou begin moving down the Ublutuoch River and then eastward across the Colville before heading south toward the Brooks Range. After calving, caribou from the CAH move toward the Sagavanirktok and follow it south to the mountains. Arctic cisco and small whitefish run upriver just before freeze-up (Hoffman, et al., 1988). Residents hunt moose in an area between the village and the confluence of the Anaktuvuk and Colville Rivers. However, due to a steep decline in moose populations on the North Slope, residents may need to travel further upriver for a successful hunt (Carroll, 1996). Blueberries, cloudberries, cranberries, wild potato and wild rhubarb are also harvested (Jacobson and Wentworth, 1982).

In 1998, Nuiqsut harvested four whales, Kaktovik harvested three and Barrow harvested 16 (AEWC, 1998). Whaling begins in the first week of September. Whaling teams travel by boat down the Colville River through Simpson Lagoon to set up camp on Cross or Nora Islands; a trip that takes about eight hours according to whaling captain Frank Long (1996). From there, teams in either skin boats or moderate size skiffs travel as quietly as possible into the Beaufort Sea, north, northeast, and east from Cross Island, as far as 44 miles from land (Long, 1996) into the migratory path of the bowhead whale. A well known whaling captain and former mayor of the NSB describes the method; “During the fall hunt, boats move at very low speeds until a whale is spotted.” (Ahmaogak, G.,1996b). Whaling boats base out of the Cross Island camp as long as two weeks or more. Often, seas are rough, and the further offshore crews must travel to find whales, the greater the risk. Ringed and bearded seal, king eider, caribou and polar bear may also be hunted during whaling expeditions (Hoffman, et al., 1988). After a whale is struck, it is towed to Cross Island, pulled onshore with a winch, and butchered. Then, the whale is transported by boat to Nuiqsut, or to West Dock or Endicott and trucked to Olitok Point (Long, 1996). Historically, whole villages have participated in the processing and distribution of whales taken from the Beaufort Sea. The whale is shared during potlucks throughout the year, and at Thanksgiving, Christmas, and “Nalukataq”; the harvest feast where fish, caribou, whale meat, and muktuk is portioned out to every member of the community (NSB, 1997:30)(MMS, 1996)(Jacobson & Wentworth, 1982).

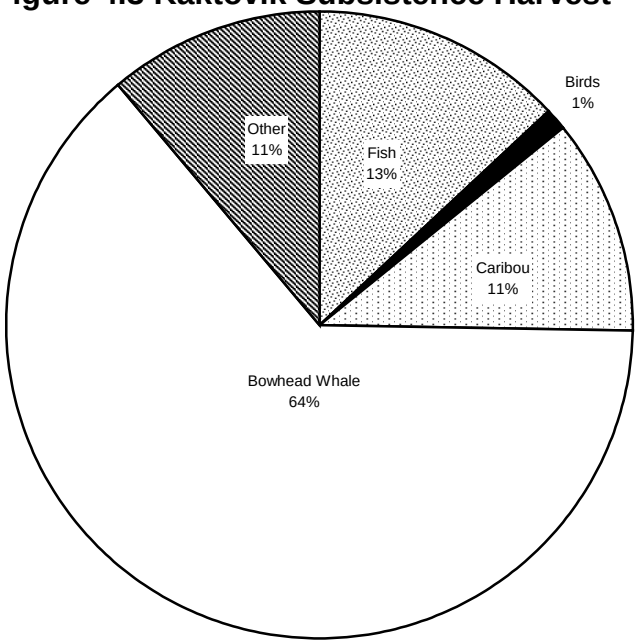
By mid-October, after the rivers freeze, residents travel by snowmachine to fish camps on the Colville River or Fish Creek where they fish for arctic cisco and small whitefish (Hoffman, et al., 1988). Ice fishing is accomplished by cutting holes in the ice and then stretching gill nets under the ice (George and Nageak, 1986: 16). Hook and line is used to fish for lingcod and grayling. Some moose and caribou hunting may occur during October and November (Hoffman, et al., 1988) while polar bears are hunted from October to May (NSB, 1979). In December, Arctic fox, cross fox, red fox, wolves, and wolverine are trapped or shot. Some caribou and moose may be harvested, and seals are often taken in the remaining open leads of sea ice. From January to March, trapping continues and some hunting of caribou and moose may occur, depending on the depth of the snow and ability to move about (Hoffman, et al., 1988).

Mid-April brings an end to trapping season and hook and line fishing for lingcod and lake trout resumes. Wolf and wolverine are hunted using rifle and snow machine. Seals sunning themselves on the sea ice are harvested year round. These conditions persist through May until the river ice again washes out to sea, completing the annual cycle of subsistence harvest (Hoffman, et al., 1988).

b. Kaktovik

Kaktovik subsistence harvest areas range from east of the Canadian border to Camden and Mikkelson Bays. Traditional Land Use Inventory sites are discussed in Jacobson and Wentworth (1982). Important locations in the Kaktovik Traditional Land Use Inventory (TLUI) in or adjacent to the sale area include Flaxman Island, Brownlow Point, and Tigutaaq at the confluence of the Tamayariak and Canning Rivers. The primary early winter camps of Kaktovik people are located along the Hulahula and Sadlerochit Rivers (Jacobson and Wentworth, 1982).

Figure 4.3 Kaktovik Subsistence Harvest



Source: ADF&G, Division of Subsistence, 1992 Survey Year

The annual cycle of subsistence activity for Kaktovik is similar to that of Nuiqsut; the same species are harvested at the same time, but from different lakes, rivers, uplands, islands, estuaries, and marine waters. Residents travel to the mountains to hunt wolf, sheep, wolverine, and moose in March., April and May are important months for hunting ground squirrel, ptarmigan, and marmot. In late May and early June, residents camp in the Camden Bay area to hunt migrating waterfowl such as eider and brant. By June, mobility is increasingly restricted as a result of spring thawing. Birds, seals, and caribou are then hunted closer to Barter Island. After calving in late May and early June, caribou from the Porcupine herd graze the area between the Canning River and the Mackenzie River delta. Kaktovik residents harvest caribou year-round from two caribou herds: the migratory PCH and the resident Central Arctic herd (CAH). This harvest occurs along the coast during the summer when hunters can travel by boat to caribou congregated along the coastline and inland during the fall and spring when snowmachine travel is possible. By late June, land travel is restricted by the spring thaw while sea ice still remains. In July, after the sea ice goes out residents use boats to hunt caribou and fish for arctic char with nets. In the fall, caribou begin moving toward their winter habitat on the south side of the Brooks Range. The month of August is good for fishing char and arctic cisco (Jacobson and Wentworth, 1982). As in Nuiqsut, blueberries, cloudberries, cranberries, wild potato and wild rhubarb are also harvested (Jacobson and Wentworth, 1982).

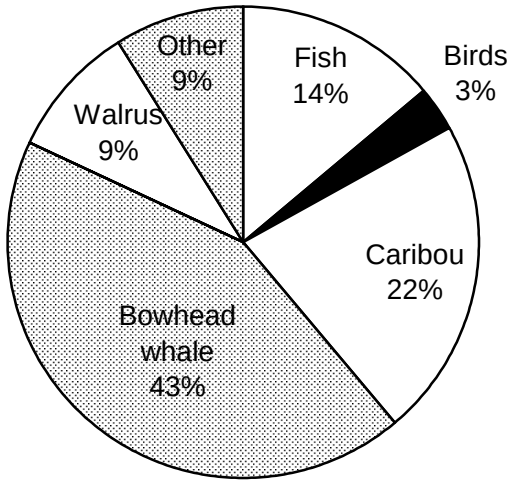
Kaktovik residents hunt bowhead whales as they return from feeding grounds in the Canadian Beaufort Sea. In July, the whales are mainly in Canadian waters, especially in the Hershel Island to Shingle Point region. Kaktovik residents begin looking for whales in August. One common area where whales are seen is Jago Spit. In early August, whales can be found offshore from West Barter Island to the Kuvritovik Entrance. Smaller bowhead whales can be seen at Jago Entrance in mid-August. Whales never come into the lagoon, inside the barrier islands, and are harvested off Bernard Spit in September. Whaling locations include Jago Entrance, Kuvritovik Entrance, and Tapkaurak Entrance. Important waters for Kaktovik whalers are Camden Bay to Tapkaurak Entrance. Whales stay in certain areas for several days for unknown reasons. Whales may stay in the Demarcation Bay area for two weeks or more before heading west. Sometimes there will be a two-week pause in spotting whales (LGL, 1998: Appendix F).

The timing of the hunt depends on weather conditions and presence of whales, although the Kaktovik Whaling Captains Association has decided to begin each year on September 1. Weather permitting, the quota can be reached in a week, two whales in two or three days (LGL, 1998: Appendix F). When the water is open and weather is clear, Kaktovik whalers go north of Barter Island 10 to 12 miles and then slowly motor east. Kaktovik whalers do not like to go farther than the Jago Spit-Tapkaurak Entrance area to the east or Arey Island to the west, but will go as far east as Griffin Point. When the wind is blowing from the east, the tide is low enough to make launching boats difficult. One whaler said the water is getting shallow west of Bernard Spit. If ice is tight near Barter Island, it tends to be more open in Camden Bay, allowing whalers to use leads from there. Other times there may be no ice, but wind and waves make whaling too rough. Also restricting the hunt is the fact that the whale must be delivered to the butcher site before it spoils (LGL, 1998: Appendix F).

c. Barrow

Barrow residents enjoy a diverse subsistence hunting base that includes both marine and terrestrial animals. Barrow residents hunt bowhead whale during both spring and fall, however, more whales harvested in the spring, which is the major whaling season. No other marine mammal is harvested with the intensity and concentration effort that is expended on the bowhead whale. Other marine mammals harvested include belukha whales, seals, and walrus (MMS, 1996:III-C-11). Polar bears comprise a small portion of the Barrow subsistence harvest and are hunted from October to June (MMS, 1996:III-C-13).

Figure 4.4 Barrow Subsistence Harvest



Source: ADF&G Division of Subsistence 1989 Survey

Barrow residents harvest marine and riverine fishes. Intensive marine fishing takes place along the Beaufort Sea coast and in Dease Inlet and Admirality Bay. Fishing occurs primarily in the summer and fall months and peaks in September and October. Capelin, char cod, grayling, salmon, sculpin, trout, and whitefish are harvested. From December through March, tomcod are fished through the ice. The subsistence harvest for fish is extensive, because Barrow residents supplement their camp food with fish whenever they are hunting (MMS, 1996:III-C-12).

Migratory birds, particularly eider, ducks and geese, provide an important food source for Barrow residents. Geese are harvested more inland, along rivers, while eider and ducks are taken along the coast. Concentrated hunting areas are located from Point Franklin to Admirality Bay and Dease Inlet and along the major barrier islands of Elson Lagoon. The harvest peaks in May and early June and continues until the end of June (MMS, 1996:III-C-13).

Bowhead whales are hunted in both the spring and fall from Barrow. In 1998, there were 47 registered whaling captains in Barrow. Each captain has a crew averaging five to eight persons, bringing the total number of whalers in Barrow to 376 (MMS, 1999). In the spring (early April to June), bowheads are hunted from leads in the retreating pack-ice, outside of the sale area. Whales are harvested from Pt. Barrow to Skull Cliff in the Chukchi Sea. Approximately 30 camps may be set up along the edge of the landfast ice (USDOI, 1998). If Barrow whalers do not get their quota in the spring, they will hunt them in the fall between Barrow and Cape Simpson and as far as 30 miles offshore (MMS, 1996:III-C-11).

"Usually, fall whaling is not conducted out of Barrow because quotas are often met at the spring hunt and the conditions of fall whaling are much less pleasant than for spring whaling." (IAI, 1990:BRW-87). Apparently, whaling effort from Barrow in the fall has increased in recent years. In fall 1997, at least 21 bowheads were harvested in the Beaufort Sea and in fall 1998, 16 were harvested in the same region (between 156° and 155° 25' West longitude). In each of these years, two whales were harvested in the sale area and the rest in federal waters (MMS, 1999). Beluga whales are occasionally harvested following the spring hunt.

Barrow residents hunt caribou throughout the year along the Chukchi coast, inland to the Brooks range, and east to the Colville River. Seals are harvested mostly during winter, especially from February to March. Ringed seals are the most common harvested and spotted seals are only harvested in summer. Spotted seals are occasionally harvested in the leads north of Barrow and along the barrier islands bordering Elson Lagoon, especially at Oarlock Island in Admiralty Bay. Bearded seals are important subsistence resource because of their skins. They are hunted in both the Beaufort and Chukchi Seas in summer and in Dease Inlet and Admiralty Bay. Barrow residents fish year round. Most fishing occurs in inland camps located along rivers that flow into the southern end of Dease Inlet and Teshekpuk Lake. Set nets are used for whitefish, char, and salmon. These camps provide access to caribou and waterfowl hunting grounds. Whitefish and grayling migrate out of inland lakes into major rivers and berries are ripe in August. Walrus are hunted southwest of Barrow, outside of the sale area (USDOI, 1998).

4. Harvest Levels of Plants, Fish and Game, Species Variety and Participation Levels

Factors that affect subsistence harvests include the availability of fish and wildlife, weather, terrain, methods of harvest, the availability of transportation, state and federal hunting and fishing regulations, local economic conditions, and the availability of cash for supplies and transportation (Jacobson and Wentworth 1982:30) (Pederson, Coffing, and Thompson, 1985:15). Others include changing conditions of the meat, hide or fur (Jacobson and Wentworth, 1982:29) and community needs. Soggy tundra and shallow rivers restrict most summertime activities to the coastal areas; however, frozen ground and snow cover, along with the use of ATVs, and snow machines, expand harvest areas during the winter.

Subsistence resources are shared between wage earning and non-wage earning members of the community as well as with relatives and others living in North Slope communities, Fairbanks, and Anchorage (NSBCMP, 1984a:2-20). Fish, caribou, and bowhead whales comprise the bulk of the nutritional needs of the

Inupiat (ADF&G, 1995), but other animals are important for nutritional and cultural uses. The harvesting of certain animals, such as wolf and wolverine, have a different cultural value than other animals used as a food source.

Nuiqsut residents harvested an average of 741.8 pounds per person of usable subsistence resources for home use and non-commercial exchange between households in 1993. Fish, land mammals, and marine mammals each approximated a third of the subsistence resource harvested. Birds and eggs accounted for about two percent of the community harvest (ADF&G, 1996a).

Species harvested in the sale area include salmon, cod, rainbow smelt, burbot, arctic char, arctic cisco, least cisco, lake trout, grayling, sheefish, whitefish, brown bear, polar bear, caribou, moose, muskox, arctic fox, red fox, ground squirrel, wolf, wolverine, weasel, marmot, mink, ducks, geese, brant, ptarmigan, sandhill crane, tundra swan, salmonberries, blueberries, blackberries, cranberries, greens, and mushrooms (ADF&G, 1995)(NSB, 1997). On average, Nuiqsut households used more than 20 different kinds of wild resources, 12 types of resources were shared and 11 varieties given away (ADF&G, 1996a).

During the 1985 survey year, subsistence harvests averaged about 400 pounds per person, most of which came from caribou and whitefish. At that time, the bowhead whale harvest was limited, but in the following years the marine mammal take increased in proportion to the total subsistence harvest of the community. The per capita harvest nearly doubled between 1985 and 1993 and the importance of Nuiqsut's subsistence harvest is underscored. "This is significant to keep in mind as Nuiqsut's immediate subsistence resource area is presently undergoing intensive oil and gas exploration, and increasing industrial development associated with oil extraction is taking place within Nuiqsut's general subsistence resource area." (ADF&G, 1996a:3)

In 1993, 94 percent of the 242 edible pound per capita land mammal harvest consisted of caribou. Caribou are an important subsistence resource for local residents. An estimated 672 caribou were harvested by Nuiqsut residents in 1993 (ADF&G, 1995), probably from the Central Arctic herd. Caribou are a staple food that is eaten fresh, frozen, and dried. When available, caribou provide a source of fresh meat throughout the year. Caribou skins are used to make blankets, sleeping pads, parkas, boot soles, mitts, and masks. Moose and brown bear are hunted along the Colville River. Nine moose were taken by the village in 1993; however, the moose population near Nuiqsut has declined rapidly in this decade. About 600 small land mammals were harvested by Nuiqsut residents in the survey year as well as over 300 ground squirrels, 200 foxes, 31 wolves, about 20 wolverine, and 10 weasels (ADF&G, 1997).

More than half of the 12 pounds per capita harvest of birds in 1993 consisted of geese; the remainder were ducks and ptarmigan. Nuiqsut village took about 2 Eider ducks, 1 brant, 2 Canada geese, 2 white-fronted geese, and 3 ptarmigan per person in 1993. Sixteen snow geese, 7 tundra swans, 78 oldsquaw, and 25 pintail ducks were harvested by village residents in that year. Over 100 pounds of Eider duck and geese eggs were harvested in 1993, as well (ADF&G, 1997).

In 1993, bowhead whale made up 90 percent of the 236-pound per capita marine mammal harvest. Ringed seals made up the remainder of about one seal for every four people. About six bearded seals were harvested by the hunters of Nuiqsut. Polar bears are hunted in the sale area and a few walrus may be taken if the opportunity arises (ADF&G, 1997). In 1993, 46 percent of the 250 pound per capita fish harvest consisted of broad whitefish, 39 percent were either Arctic cisco or Least cisco, seven percent were burbot, five percent were grayling, and the remainder included Arctic char and salmon (ADF&G, 1995).

All Nuiqsut households used subsistence resources in 1993. Of those who attempted to harvest subsistence resources, 90 percent were successful. Ninety-eight percent of all households in the community received wild resources while 92 percent gave them away (ADF&G, 1995). In addition to being consumed at home, a large but unknown portion of the fish caught are either shared with other communities in the area or sold. (George and Nageak, 1986:15). Most Nuiqsut families participate in subsistence fishing activities. The bulk of the fishing in the 1980s was probably done by about half the families in the area (George and Nageak, 1986).

Kaktovik residents harvested an average of 886 pounds per person of usable subsistence resources in 1992. Of that, almost two-thirds were bowhead whales, indicating the importance of this animal to the community diet. Other resources consumed were moose, caribou, Dall sheep, walrus, and seals. Kaktovik residents harvested 158 caribou in 1992; down from 174 the previous year (ADF&G, 1996). Caribou are hunted in the mountains in October and along the shores of Camden Bay in July (LGL, 1998: F-19). Birds and eggs provided about two percent of per capita consumption with 369 ducks and 601 geese harvested in 1992 (ADF&G, 1996).

Barrow residents harvested about 290 pounds per person of usable subsistence resources in 1989. Of that, 43 percent was bowhead whale. For the same year, Barrow residents harvested an estimated 1,656 caribou, 40 moose, 39 polar bears, 440 seals, 8,589 ducks, and 3,944 geese (ADF&G, 1996).

Subsistence resources are utilized for much more than just nutrition. Many non-edible parts of the animals harvested are used to make both functional items as well as arts and crafts. Driftwood and willow is collected for both firewood and building materials. Marine mammal bones and hides are used to construct temporary shelters and traditional boats. Caribou hides are used for bedding, clothing, and masks. Seal skins are used for carrying water and for covering traditional boats. Whale baleen is decorated and etched into story-telling art works and baskets. Ivory, caribou antler and bone, and whale bones are carved into miniature animals, umiaks, and hunting scenes, or made into functional items such knife or ulu handles and needle cases. Jewelry is made out of many things, including ivory, antler, feathers, and imported beads. Bearded seal whiskers are used in making earrings. Wolverine, wolf, polar bear, seal, and fox fur are used to make parkas, slippers, mukluks, and hats. They are also used in making dolls, Eskimo yo-yos, and caribou skin masks. Feathers and skins are used to make drums and many other craft items, such as spirit masks.

It has been estimated that at least one in ten residents of the borough produces arts and crafts. These items are often traded, shared, given away, or sold. Prices vary widely ranging from ten or twenty to thousands of dollars. These items are probably made for two basic reasons, recreation and artistic expression, or to raise cash for a specific purpose, such as an airline ticket. They are not produced solely for the purpose of generating income in order to perpetuate the craft (Steihn & Hayes, 1996).

D. Other Uses

1. Commercial and Sport fishing

Nine residents of the NSB held commercial fishing permits in 1995 (ADCRA, 1997). A commercial fall whitefish fishery is located on the east channel of the Colville River. This gill-net fishery is the only commercial fishery within the sale area. In 1995, nearly 6,000 pounds of humpback or broad whitefish were harvested, valued at $4,480 to fishers. In the same year, 9,121 pounds of arctic cisco, worth $12,541 to fishers, were landed (Busher & Borba, 1996).

ADF&G tabulates non-subsistence sport fishing catch and harvest estimates for the entire North Slope drainage area. Fishing effort, catch and harvest for the Sagavanirktok River is also tracked. Most sport fish caught are not harvested, but released back to the water. For example, ADF&G estimates that 1,716 Arctic char were caught on the Sagavanirktok River by sport fishers in 1994, but only 147 were harvested. Similarly, an estimated 2,644 grayling were caught on the river, but only a few were actually harvested (ADF&G, 1996b).

2. Sport Hunting, Guiding & Outfitting

Sport harvesting of big and small game in the onshore portion of the sale area is managed by ADF&G, Division of Wildlife Conservation. The state is divided into 26 game management units (GMU). All Arctic ocean drainages between Cape Lisburne and the Alaska-Canada border are contained in GMUs 26A, 26B, and 26C. Unit 26A lies west of the Itkillik River drainage, and west of the east bank of the Colville River between the mouth of the Itkillik River and the Arctic ocean. A significant portion on Unit 26A overlaps with NPR-A. Unit 26B extends from the eastern boundary of 26A to the west bank of the Canning River, and the west bank

of the Marsh Fork of the Canning River. All of Unit 26C is within ANWR. It is unknown exactly how many animals of each species are harvested within the sale area in any given year.

Sport hunting harvest statistics collected by ADF&G are not specific to the sale area, but estimate the harvest for entire GMUs. Statistics on hunter residency, success rate, mode of transportation, and whether commercial services were used are also collected. Transportation data reflect the mode each hunter used to get to the point where they started walking (ADF&G, 1996b).

Hunting seasons and guidelines are determined by the Alaska Board of Game, and administered by ADF&G. The Prudhoe Unit is closed to big game hunting (5 AAC 92.510), however, residents may sport hunt in other oil fields. The possession of firearms by industry employees is restricted, and workers are not likely to sport hunt in the area during their active-duty shifts. Moose hunting is closed to non-residents on the North Slope (ADF&G, 1996c).

3. Tourism and Recreation

According to a 1993 survey conducted by the state Division of Tourism & Trade, 35,400 Alaska visitors traveled the Trans-Alaska Pipeline haul road (Dalton Highway), 17,700 visitors toured the Prudhoe Bay oil fields, and 3,000 visitors saw Barrow, the northernmost point in North America (ADCED, 1993:57).

Recreational uses of the sale area include hiking, flight-seeing, and boating or rafting. Each of these activities has its associated costs, which can be very high in the Arctic. Considering the remoteness and isolation of the sale area, all recreationists must use some kind of commercial outfitter to access the area, and nearly all must fly in. Most outfitters are based out of Fairbanks. In summer, visitors come to the region to camp, hike, float down the Canning River in a river raft, or watch and film whales, birds or caribou.

After October, there are virtually no non-resident recreationists in the sale area. Winter recreation for residents usually occurs near villages. The most favorable months for winter activities such as snow machining and dog sledding are mid-March to early May, when temperatures are higher and daylight hours longer (NSBCMP, 1984a:3-29). The colder and darker months of winter are ideal for social gatherings and the making of crafts.

E. References

Ahmaogak, G.
1996b Written Comments to Cynthia Quarterman, Director, MMS Regarding OCS Oil and Gas Lease Program: 1997-2002, Draft EIS. May 7.

ADF&G
1997 Community Profile Database, Volume 5: Arctic Region, Division of Subsistence, Alaska Department of Fish and Game, Juneau.
1996a Nuiqsut: Wild Resource Harvests and Uses in 1993. Division of Subsistence, Alaska Department of Fish and Game, January.
1996b Alaska Wildlife Harvest Summary, 1994-1995. Alaska Department of Fish & Game, Division of Wildlife Conservation, Information Management Section, Wildlife Information Data Base Project, March 6.
1996c Alaska Hunting Regulations, No. 37. Alaska Department of Fish and Game, Division of Wildlife Conservation, Effective Dates July 1, 1996-June 30, 1997.
1996d Harvest, Catch, and Participation in Alaska Sport Fisheries During 1996. Alaska Department of Fish and Game, Division of Sport Fish. Fishery Data Series No. 97-29
1995 Community Profile Database, Volume 5: Arctic Region. Division of Subsistence, Alaska Department of Fish and Game, Juneau, September.
1986 Alaska Habitat Management Guide, Arctic Region Volume II: Distribution, Abundance and Human Use of Fish and Wildlife. Division of Habitat, Alaska Department of Fish and Game, Juneau.

ADCED
1993 Alaska Visitor Patterns, Opinions and Planning, Summer 1993. Alaska Department of Commerce and Economic Development, Division of Tourism, Alaska Visitor Statistics Program, Prepared by the McDowell Group, Juneau.

ADCRA
1997 DCRA Community Database. Department of Community and Regional Affairs, Research and Analysis Section.
1995 DCRA Community Database. Department of Community and Regional Affairs, Research and Analysis Section.

ADOL
1996a Labor Department Estimates Alaska's 1996 Population. Alaska Department of Labor, Division of Administrative Services, Press Release, September 24.
1996b Draft 1996 Employment & Earnings Summary Report. Alaska Department of Labor, Division of Administrative Services.

AEWC (Alaska Eskimo Whaling Commission)
1998 Personal communication from Maggie Ahmaogak, Executive Director, AEWC, to Tom Bucceri, DO&G, November 17.

Busher, William & Borba, Bonnie
1996 Commercial Finfish Catch Statistics for the Upper Yukon and Northern Management Areas, 1995. Alaska Department of Fish & Game, Commercial Fisheries Management and Development Division, A-Y-K Region, Regional Information Report No. 3A96-07, January.

Bryner, William M.
1995 Toward a Group Rights Theory for Remedying Harm to the Subsistence Culture of Alaskan Natives. Alaska Law Review, Vol. 12:2, pp. 293-334.

Carroll, Geoff
1996 Personal communication with Geoff Carroll, ADF&G, to Brian Havelock, DO&G, May 7.

George, John C., and Benjamin P. Nageak
1986 Observations on the Colville River Subsistence Fishery at Nuiqsut, Alaska, for the period 4 July - 1 November 1984. Department of Wildlife Management, North Slope Borough, July.

Haynes, Terry and Sverre Pederson
1989 Development and Subsistence: Life After Oil. Alaska Fish and Game, 21(6): p.24-27, November-December.

Hoffman, David, David Libbey, and Grant Spearman
1988 Nuiqsut: Land Use Values Through Time in the Nuiqsut Area. North Slope Borough and The Anthropology and Historic Preservation Section of the Cooperative Park Studies Unit, University of Alaska, Fairbanks, Occasional Paper Number 12, 1978, Rev. 1988.

IAI (Impact Assessment, Inc.)
1990 Northern Institutional Profile Analysis: Chukchi Sea, Final Technical Report. Impact Assessment Inc., Technical Report No. 141, OCS Study MMS 90-0022, May.

Jacobson, Michael, J., and Cynthia Wentworth
1982 Kaktovik Subsistence: Land Use Values Through Time in the Arctic National Wildlife Refuge Area. USF&WS, Northern Alaska Ecological Services, Fairbanks.

LGL
1998 Bowhead Whale Feeding in the Eastern Alaskan Beaufort Sea: Update of Scientific and Traditional Information: Denis H. Thompson and W. John Richardson, eds., LGL Limited, environmental research associates and LGL Ecological Research Associates, Inc. for Department of the Interior, Minerals Management Service, Draft Report, July 6.

Lampe, Leonard
1996 Written comments of Leonard Lampe, Vice-Mayor of Nuiqsut, to DO&G Regarding Proposed Oil and Gas Lease Proposed Sale 86, March 13, 1996.

Landino, et al.
1994 A Large Aggregation of Bowhead Whales (Balaena mysticetus) Feeding near Point Barrow, Alaska, in Late October 1992. S.W. Landino, S.D. Treacy, S.A. Zerwick, and J.B. Dunlap, In Arctic, Vol. 47, No. 3 (September 1994), p.232-235.

Langdon, Steve J.
1996 An overview of North Slope Society: Past and Future. Steve J. Langdon, Department of Anthropology, University of Alaska Anchorage, *In* Proceedings of the 1995 Arctic Synthesis Meeting, Minerals Management Service OCS Study MMS 95-0065, February.

Long, Frank Jr.
1996 History of Subsistence Whaling by Nuiqsut. Frank Long Jr., President of the Nuiqsut Whaling Captains Association, *In* Proceedings of the 1995 Arctic Synthesis Meeting, Minerals Management Service OCS Study MMS 95-0065, February.

Lowry, L.F., and Frost, K.J.
1984 Foods and Feeding of Bowhead Whales in Western and Northern Alaska. Sci. Rep. Whales Res. Inst. 35:1-16.

MMS (Minerals Management Service)
1999 Seventh Information Transfer Meeting: Proceedings. Prepared byMBC Applied Environmental Sciences, January 19-21, 1999 Sheraton Anchorage Hotel, OCS Study MMS 99-0022, March.

1998 Alaska Annual Studies Plan, Final FY 2000-2001. Minerals Management Service, Alaska Outer Continental Shelf Region, December.
1995 An Investigation of Socicultural Consequences of Outer Continental Shelf Development in Alaska, Volume V, Chapter XXII, MMS 95-014, March.
1990 Subsistence Resource Harvest Patterns: Kaktovik: Final Special Report no. 9. Prepared by Impact Assessment Inc., for Minerals Management Service, OCS Region, July 24.
1987 Subsistence Fisheries at Coastal Villages in the Alaskan Arctic, 1970-1986. Prepared by Peter C. Craig, LGL Alaska Research Associates, Inc. for Minerals Management Service, OCS Region, OCS Study MMS 87-0044, July.

Noland, L.J. & Gallagher, T.
1989 Cross-Cultural Communication for Land Managers and Planners in Alaska. In Agroborealis, Vol. 21, No. 1.

NRC
1994 Environmental Information for Outer Continental Shelf Oil and Gas Decisions in Alaska, National Research Council, National Academy Press.

NSB
1997 North Slope Borough Subsistence Documentation Project: Data for Nuiqsut, Alaska for the period July 1, 1994 to June 30, 1995. Prepared by Harry K. Brower, Jr., and Raynita “Taqulik” Opie, NSB Department of Wildlife Management, January 14.
1996 North Slope Borough Subsistence Documentation Project: Data for Anaktuvuk Pass, Alaska for the period July 1, 1994 to June 30, 1995. Prepared by Harry K. Brower, Jr., and Raynita “Taqulik” Opie, NSB Department of Wildlife Management, September 16.
1994 Comprehensive Annual Financial Report of the North Slope Borough, Alaska: Fiscal Year July 1, 1993-June 30, 1994. Prepared by Department of Administration and Finance, North Slope Borough.
1993 North Slope Borough 1993/94 Economic Profile and Census Report, Vol. VII. North Slope Borough, Department of Planning & Community Services.
1979 Nuiqsut Heritage: A Cultural Plan. Prepared for the Village of Nuiqsut and the North Slope Borough Planning Commission and Commission on History and Culture, February.

NSBCMP
1988 North Slope Borough Coastal Management Program. Maynard & Partch, Woodward-Clyde Consultants, April.
1984a North Slope Borough Coastal Management Program Background Report. Maynard & Partch, Woodward-Clyde Consultants.
1984b North Slope Borough Coastal Management Program Resource Atlas. Maynard & Partch, Woodward-Clyde Consultants, July.

Pederson, Sverre
1997 Personal communication between Sverre Pederson, ADF&G Subsistence Division and Tom Bucceri, DO&G, July 7.
1990 Caribou Hunting: Land Use Dimensions, Harvest Level, and Selected Aspects of the Hunt During Regulatory Year 1987-88 in Kaktovik, Alaska. Division of Subsistence, Alaska Department of Fish and Game, Technical Paper No. 171.

Pederson, Sverre, Haynes, Terry L., and Wolfe, Robert J.
1991 Historic and Current Use of Musk Ox by Kaktovik Residents. Division of Subsistence, Alaska Department of Fish and Game, Technical Paper No. 206.

Pederson, Sverre, Coffing, Michael W., and Thompson, Jane.
1985 Subsistence Land Use Baseline for Kaktovik, Alaska. Division of Subsistence, Alaska Department of Fish and Game, Technical Paper No. 109.

Steihn, Lynn, and Hayes, Helen
1996 Personal communications with Lynn Steihn and Helen Hayes, Arctic Development Council, and Brian Havelock, DO&G, October 25 and November 1.

USDOI
1998 Northeast National Petroleum Reserve-Alaska Final Integrated Activity Plan/Environmental Impact Statement. U.S. Department of Interior, Bureau of land Management and Minerals Manegement Service, August.

USF&WS
1988 Subsistence Management and Use: Implementation of Title VIII of ANILCA: Final. United States Fish and Wildlife Service, Anchorage, March.